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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF:

Lee CHEN

SERIAL NO: 10/501,987

GROUP: 1763

FILED: June 6, 2005

EXAMINER: OLSEN, ALLAN W.

FOR: PLASMA ETCHING OF NI-CONTAINING MATERIALS

LETTER

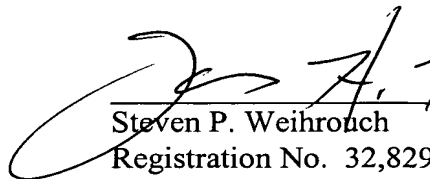
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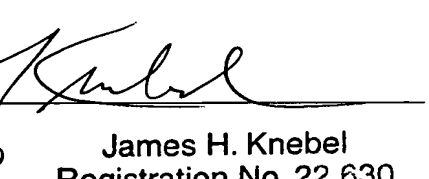
Sir:

Submitted herewith is an International Preliminary Examination Report for the Examiner's consideration. The reference(s) cited therein have been previously filed with the International Search Report in an Information Disclosure Statement submitted to the U.S. Patent and Trademark Office on July 21, 2004.

Respectfully Submitted,

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 217381WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US03/00049	International filing date (day/month/year) 28 January 2003 (28.01.2003)	Priority date (day/month/year) 29 January 2002 (29.01.2002)
International Patent Classification (IPC) or national classification and IPC IPC: C23F 1/02(2006.01),1/08(2006.01),1/12(2006.01) USPC: 216/64,68,69,75		
Applicant TOYKO ELECTRON LIMITED		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

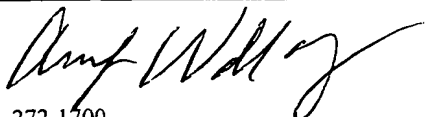
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of — sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 30 July 2003 (30.07.2003)	Date of completion of this report 09 May 2006 (09.05.2006)
Name and mailing address of the IPEA/US Mail Stop PCT, Attn: IPEA/ US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Allan Olsen  Telephone No. 571-272-1700

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US03/00049

I. Basis of the report1. With regard to the **elements** of the international application:*

- ☒ the international application as originally filed.
- ☒ the description:
pages 1-10 as originally filed
pages NONE filed with the demand
pages NONE filed with the letter of _____.
- ☒ the claims:
pages 11-14 as originally filed
pages NONE as amended (together with any statement) under Article 19
pages NONE filed with the demand
pages NONE filed with the letter of _____.
- ☒ the drawings:
pages 1-9 as originally filed
pages NONE filed with the demand
pages NONE filed with the letter of _____.
- ☐ the sequence listing part of the description:
pages NONE as originally filed
pages NONE filed with the demand
pages NONE filed with the letter of _____.

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages NONE
- ☐ the claims, Nos. NONE
- ☐ the drawings, sheets/fig NONE

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US03/00049**V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

Novelty (N)	Claims <u>3, 5-11, 16-21, 28</u>	YES
	Claims <u>1, 2, 4, 12-15, 22-27, 29-39</u>	NO
Inventive Step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-39</u>	NO
Industrial Applicability (IA)	Claims <u>1-39</u>	YES
	Claims <u>NONE</u>	NO

2. CITATIONS AND EXPLANATIONS

Please See Continuation Sheet

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US03/00049

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Claims 1, 15, 22-26 and 29-39 lack novelty under PCT Article 33(2) as being anticipated by US Patent 6,156,666 issued to Tokushima. filed 7-21-04

Tokushima teaches plasma etching a Ni-containing material with a carbonyl-containing etchant gas. Tokushima teaches a substrate temperature of 40° C (see abstract). Tokushima teaches that a variety of plasma apparatus (e.g., ECR, RIE, ICP) (column 7, lines 8, 9). With respect to apparatus claims 29-39, it is noted that the provision of a particular gas to an apparatus is considered to be a method step. A reference is considered to meet such a limitation in an apparatus claim as long as the apparatus of the reference is capable of performing the claimed method.

Claims 1, 2, 4, 22 and 29-39 lack novelty under PCT Article 33(2) as being anticipated by JP 02-088782 (hereinafter Hitachi). Hitachi teaches plasma etching a Ni-containing material with an etchant gas comprising at least one of carbon monoxide, water and hydrogen halides. See JPO abstract. The apparatus of Hitachi is capable of receiving each of the claimed gases. filed 7-21-04

Claims 1, 15, 22, 23 and 25 lack novelty under PCT Article 33(2) as being anticipated by Derwent abstract 1976-26963X of JP 51022637 (hereinafter Fujitsu). filed on 7-21-04

Fujitsu teaches plasma etching a Ni-containing material with an etchant gas comprising at least one of carbon monoxide and carbon dioxide.

Claims 1, 12, 22-27, and 29-39 lack novelty under PCT Article 33(2) as being anticipated by JP 2000322710 (hereinafter, Mashita). filed on 7-21-04

Mashita teaches plasma etching a Ni and Fe containing material with carbon monoxide as the etchant gas. Mashita teaches that a variety of plasma apparatus, including helicon wave, RIE and ICP, that are capable of receiving the claimed gas mixtures (see: figures 1 and 3; column 2, line 17; column 10, line 47).

Claims 1, 13-15, 22 and 29-39 lack novelty under PCT Article 33(2) as being anticipated by US Patent 6,225,202 issued to Gupta et al. (hereinafter, Gupta). filed 7-21-04

Gupta teaches plasma etching a Ni-containing material with a carbonyl-containing etchant gas. Gupta teaches a substrate temperature of 40° C (see abstract). Gupta teaches that a variety of plasma apparatus (e.g., ECR, RIE, ICP) (column 7, lines 8, 9) that are capable of operating with the claimed gas mixtures.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/US03/00049

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Claims 3, 5, 7, 9, 11, 13-16, 18, 20, and 23-28 lack an inventive step under PCT Article 33(3) as being obvious over Hitachi. The JPO abstract of Hitachi recites "a gaseous etchant contg. at least one kind among carbon monoxide, water and gaseous hydrogen halides..."

Hitachi does not explicitly teach a combining CO with each of HF, HCl, HBr and HI.

It would have been obvious to one skilled in the art to use an etchant comprising one of CO/HF, CO/HCl, CO/HBr and CO/HI because through Hitachi's teaching of hydrogen halide, the skilled artisan would immediately envisaged each of HF, HCl, HBr and HI because they are very common members of a very small class of compounds.

Hitachi does not teach the flow rates of gases. Hitachi does not teach the temperature of the substrate.

It would have been obvious to one skilled in the art to optimize process variable such as flow rate and temperature.

Claims 6, 8, 10, 17, 19 and 21 lack an inventive step under PCT Article 33(3) as being obvious over Hitachi, in view of Fujitsu. Hitachi does not teach using CO₂ as a plasma etchant for Ni.

Fujitsu teaches plasma etching of Ni by using CO or CO₂ as an etchant.

It would have been obvious to one skilled in the art to use CO₂ in place of the CO taught by Hitachi because Fujitsu teaches that CO and CO₂ are functionally equivalent with regard to the plasma etching of Ni.

Claims 23-28 lack an inventive step under PCT Article 33(3) as being obvious over Gupta.

Gupta does not teach the various types of claimed plasma apparatus (parallel plate, ICP, ECR helicon wave surface wave).

It would have been obvious to one skilled in the art to use any of the claimed plasma apparatus because Gupta teaches that "any conventional plasma etcher" may be used (col. 4, lns. 12-14).

Claims 1-39 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.